Remarks

In view of the above amendments to the claims and the following discussion, the applicants submit that the claims now pending in the application are not obvious under the provisions of 35 U. S. C. § 103. Thus, the applicants believe that all of these claims are in allowable form.

OBJECTIONS

A. Claims

1. Claim 10

Claim 10 is objected to for informalities. In particular, the Examiner indicates that the phrase "the liquid crystal layer" has insufficient antecedent basis. Applicants have amended claim 10 in this paper to provide proper antecedent basis for the phrase "the liquid crystal layer". In view of this amendment to claim 10, the basis for the Examiner's objection thereto has been removed. Therefore, applicants respectfully request that this objection be withdrawn.

REJECTIONS

A. 35 U. S. C. § 103

1. Claims 10-13 and 15-17 are not obvious over Esaki et al. In view of Lu ('828), Lu ('578) and Yajima

Claims 10-13 and 15-17 stand rejected under 35 U. S. C. § 103(a) as being unpatentable over Esaki et al. (U. S. Patent 5,716,122 issued February 10, 1998) in view of Lu (U. S. Patent 6,604,828 issued August 12, 2003), Lu (U. S. Application Publication 2004/0160578 published August 14, 2004) and Yajima (Japanese Patent Application JP04-267203 published September 22, 1992). Applicants submit that these claims are not rendered obvious by the combination of these references.

Referring to the reading light source (10) and the corresponding optical elements of the reading optical side of the system of Esaki et al., as explicitly referred by the Examiner (item 3, lines 6-7 of the Office Action), Esaki et al. discloses, an illuminating device comprising an optical source (10) emitting an unpolarized light beam (803), a polarizing beam splitter (203a, thin film group) included between first faces (middle side length of each prism) of a first and of a second transparent prism (FIG. 1 : 201x and 202x), which prisms each have a second exit face (shortest side of each prism) both situated within one and the same plane, said first faces (middle side length of each prism) and second faces (shortest side of each prism) of each prism being perpendicular; the unpolarized light beam (803) penetrating into the first prism (201x) through a third face (hypotenuse of 201x) of this first prism and reaching the polarizing beam splitter (203a, thin film group) that transmits the light with a first polarization direction (804) and that reflects the light with a second polarization direction (805); the light transmitted by the polarizing beam splitter being transmitted to a third face (hypotenuse of 202x) of the second prism that reflects it toward said second exit

face (shortest side of 202x) of the second prism, and the light reflected by the polarizing beam splitter being transmitted to said third face (hypotenuse of 201x) of the first prism that reflects it toward said second exit face of the first prism (shortest side of 201x).

The Examiner indicates that the illuminating device of Esaki et al. also comprises, a "light integrating" device (16a, 16b, optical fiber plates, belonging to the **writing** side – see below), and a spatial light modulator of a liquid crystal type ("liquid crystal layer" of the coplanar regions 40a, 40b belonging to the **reading** side of the SLM 40: see below).

As already stated by the Applicant, the optical fiber plates 16a, 16b do not performed a "light integrating" function. At col.10, lines 20-22, of Esaki et al., it is stated that, on the **writing** side, each optical fiber plate 16a, 16b **transmit "the image information pieces"** (provided by the "transmission liquid crystal panels 8a, 8b") "onto the SLM 40 (implicitly onto the photosensitive layer of the SLM 40: see below) **to modulate** the **reading** light beams (which are received then reflected by the liquid crystal layer of the SLM 40: see below)". If, as stated by the Examiner, such a transmission of "the image information pieces" provides a "light integrating" function, all image information pieces which are spatially distributed on the entry surface of the optical fiber plates 16a, 16b would become "light integrated" at the exit surface of these optical fiber plates 16a, 16b such that no difference between these "image information pieces" would remain, and such that no modulation of the reading light beams could be performed any more. That is why none of the optical fiber plates 16a, 16b can be considered as "a light integrating device". Therefore, Esaki et al does not disclose that the illuminating device also comprises a light integrating device.

Further, as explained in detail below, Esaki et al does not disclose that "one entry face of the light integrating device receives the beams reflected by the third faces of the prisms".

At column 6, lines 34-56, of Esaki et al., it is stated that:

i) "Numeral 40 denotes the SLM for modulating a state of polarization of the reading light emergent from the optical element 20X (with the prisms 201x and 202x quoted above).

ii) ... referring to FIG. 6, The SLM 40 has a region 40aa and a region 40bb of light-receiving surfaces for receiving writing light in one surface of SLM, and a region 40a and a region 40b of surfaces for receiving and reflecting the reading light, ...

iii) The SLM 40 is composed of a photosensitive layer, a light blocking layer, a dielectric mirror layer, and a liquid crystal layer ....

iv) The **light blocking layer and dielectric mirror layer function to insulate** the reading light 804, 805 from the writing light 807, 808, and the dielectric mirror layer functions to reflect the reading light 804, 805 back to the reading light side.

Referring again to FIG. 6, from § ii) above, the "upper" coplanar regions 40aa, 40bb belongs to the writing side of the system of Esaki et al. and the "lower" coplanar regions 40a, 40b belongs to the reading side of the system of Esaki et al. Also, from § iii) and iv) above, the "lower" coplanar regions 40a, 40b of the reading side are **optically isolated** from the "upper" coplanar regions 40aa, 40bb of the writing side. Therefore, the writing side is **optically isolated** from the reading side of the optical system.

Additionally, the alleged "light integrating" device (16a, 16b, optical fiber plates) belong to the writing optical side of the system, and the prisms (201x, 202x) belong to the reading optical side of the system.

Therefore, because of the optical insulation above, there is no entry face of the alleged "light integrating" device (16a, 16b, optical fiber plates) of the writing side that may be optically coupled to the second exit faces (shortest side of 201x and 202x) of the prisms of the reading side. Therefore, Esaki et al. does not disclose a light integrating device having one entry face that is optically

coupled to the second exit faces of the prisms. Thus, Esaki et al. does not disclose that "one entry face of the light integrating device receives the beams reflected by the third faces of the prisms".

Referring again to FIG. 6, from § ii) and § iii) above, the "lower" coplanar regions 40a, 40b of the reading side are, per se, "spatial light modulating" (light is "received and reflected"), as the "upper" coplanar regions 40aa, 40bb are NOT "spatial light modulating" (light is only "received"). Therefore, the alleged "light integrating" device (16a, 16b, optical fiber plates) of Esaki et al. delivers a beam through one exit face that illuminates the "upper" coplanar regions 40aa, 40bb, which are NOT "spatial light modulating". Therefore, the beam delivered through the exit face of the optical fiber plates (16a, 16b) does not illuminate the liquid crystal layer of the SLM 40, but the photosensitive layer of the SLM 40. Therefore, Esaki et al. does not disclose "that the light integrating device delivers a beam through one exit face whose illumination is substantially homogeneous over this face such as to illuminate the liquid crystal layer of the spatial light modulator in a uniform manner."

Finally, Esaki et al. does not disclose that the polarizing beam splitter comprises a grid polarizer situated between the first faces of the first and of the second prism (middle side length of each prism 201x, 202x). Esaki et al. does not disclose that the illuminating device comprises a polarization rotator device associated with only one of said second exit faces of the prisms (shortest side of only one prism).

The Examiner indicates at page 4, beginning at line 8): "Lu ('828) discloses (e.g. figure 3) a light integrating device that has one entry face (top portion of 351, substrate) that is optically coupled to said second exit faces of the prisms and that, receiving the beams reflected by the third faces of the prisms, delivers a beam through one exit face (entry face is the same as the exit face due to the reflective SLM) whose illumination is substantially homogeneous over

this face such as to illuminate the spatial light modulator in a uniform manner [col. 3, line 17 to col. 4, line 181]."

According to amended claim 10, this objection is circumvented,

1) notably because the exit face is NOT the same as the entry face.
2) Also because the beam which is delivered to the spatial light modulator goes through the exit face of the light integrating device (and not through the input face as in Lu ('828) because reflective SLM (LCOS) are used)
3) Also because applicant's disagree with respect to Lu ('828), that the so-called "light integrating device" which is the top face of the LCOS substrate, actually performs an "substantial homogenization of the illumination over its exit face" and a "uniformization of the illumination of the liquid crystal layer of the spatial light modulator ".

In Claim 10: .... light integrating device has **one entry face** that is optically coupled to said second exit faces of the prisms and has one exit face, **different from the entry face**, that is optically coupled with the liquid crystal layer of said spatial light modulator, wherein said light integrating device, when receiving the beams reflected by the third faces of the prisms through said entry face, delivers a beam **through said one exit face** such that illumination of said exit face is substantially homogeneous over this exit face such as to illuminate **through said one exit face** the liquid crystal layer of said spatial light modulator in a uniform manner.

The Examiner further indicates that:

1) Lu ('578) teaches (e.g. figure 2) two prisms that have a grid polarizer located between the middle side length of two prisms, and
2) Yajima teaches (e.g. figure 1) a polarization rotator device associated with only one of said second exit faces of the prisms (shortest side of only one prism).

But, as none of these references teach that:

1) the illumination device comprises a light integrating device,

2) one entry face of the light integrating device receives the beams reflected by the third faces (hypotenuses) of the prisms,

the light integrating device delivers a beam through one exit face whose illumination is substantially homogeneous over this face such as to illuminate the liquid crystal layer of the spatial light modulator in a uniform manner, 10-13 and 15-17 are patentable over Esaki et al. in view of Lu ('828), Lu ('578) and of Yajima.

CONCLUSION

Thus, the applicants submit that none of the claims presently in the application are obvious under the provisions of 35 U. S. C. § 103. Consequently, the applicants believe that all of the claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring an adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Ms. Patricia A. Verlangieri, at (609) 734-6867, so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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